Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 54 February, 1952 No. 638

NUTTALL'S GREAT PLAINS SPECIES OF CIRSIUM: C. UNDULATUM AND C. CANESCENS[1]

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IN the course of his numerous botanical expeditions, Thomas Nuttall discovered several new species of *Cirsium*, two of which were definitely from the Great Plains. These were *Cirsium undulatum* (Nutt.) Spreng. and *C. canescens* Nutt. The type specimen of each of these species is poor, and in the case of *C. canescens* has been largely inaccessible to American botanists.

Asa Gray in his synopsis of North American thistles, published in 1874, gave specific rank to only the earliest proposed of the two species, *Cnicus undulatus*, in which he recognized four varieties, namely, var. *canescens* (Nutt.) Gray, var. *megacephalus* Gray, var. *ochrocentrus* Gray, and var. *Grahami* Gray. The last two varieties will not be considered here.

Gray's disposition of Nuttall's proposed species has not proved satisfactory, and has resulted in further nomenclatorial complexities. The following discussion represents an attempt to resolve some of these difficulties. After reviewing the evidence, the present writer has found it necessary to apply the name *Cirsium undulatum* (Nutt.) Spreng. to Gray's var. *megacephalus* exclusively. *Cirsium canescens* Nutt. appears to him to represent the same entity as *C. plattensis* (Rydb.) Cockerell, and as such is specifically distinct from *C. undulatum*. Evidence supporting this disposition of Nuttall's names is presented under the species concerned.

[1] This investigation was supported in part by a grant from the Graduate School, University of Minnesota. Costs of the engravings for the plates were met from the Hayden bequest to the Dept. of Botany, U. of M. Part of the field work was done while in residence at the U. of M. Forestry and Biological Station, Itasca State Park, Minnesota.

In the preparation of this paper I am indebted to Dr. F. W. Pennell and Dr. F. G. Meyer for supplying me with photographs of types. Curators of the New York Botanical Garden Herbarium, the Gray Herbarium, the Rocky Mountain Herbarium, the Iowa State College Herbarium, and the University of Nebraska Herbarium have been of assistance in supplying additional authentic specimens. I wish to extend my thanks to these botanists.

Cirsium undulatum (Nutt.) Spreng., Syst. Veg. 3: 374. 1826.

Carduus undulatus Nutt., Gen. **2:** 130. 1818. *Cirsium undulatum* Torrey and Gray, Fl. N. Am. **2:** 456. 1843, in part; DC., Prodr. Syst. Nat. **6:** 651. 1838; Rydberg, Fl. Pr. and Plains 882. 1932; W. C. Stevens, Kans. Wild Fl. 426. 1948. Fernald, Gray's Man., ed. 8. 1541. 1950, in part. *Cnicus undulatus* Gray, in Proc. Am. Acad. **10:** 42. 1874, in part; Syn. Fl. N. Am. **1** (2): 403. 1884, in part. *Cnicus undulatus* var. *megacephalus* Gray, l. c. *Carduus undulatus* var. *megacephalus* Porter, in Mem. Torr. Bot. Club **5:** 345. 1894. *Carduus megacephalus* Smythe, in Trans. Kansas Acad. Sci. **16:** 160. 1899; Nutt. ex Daniels, in Univ. Mo. Stud. **2:** 402. 1911 (Daniels, Fl. Boulder, Colo., 254. 1911). *Cirsium undulatum* var. *megacephalum* Fernald, in RHODORA **10:** 94. 1908; O. A. Stevens, N. Dak. Pl. 293. 1950; Fernald, Gray's Man., ed. 8. 1541. 1950. *Cirsium megacephalum* Cockerell ex Daniels, l. c.; Rydberg, l. c.

Perennial from root sprouts, but not strongly so; stems erect, mostly 3–8 dm. tall, simple or sparingly branched above, densely white-tomentose throughout; juvenile leaves elliptical, nearly regular to irregularly toothed at the margins, the later ones becoming successively more deeply cut, each lobe terminated by a stoutish spine and with a few weaker marginal ones; lower cauline leaves usually with a long, winged petiole, the blade often deeply pinnatifid; *middle and upper cauline leaves sessile, the blade broadest at the base, clasping the stem*, irregularly and usually shallowly *cut at the margin into deltoid lobes*, each lobe terminated by a stout spine which is an extension of the conspicuous midrib of the lobe; *upper and lower surfaces of all the leaves densely tomentose*, the upper surface sometimes less so, becoming green in age; inflorescence a single head terminating each main branch; involucre usually large, about 3.0 (2–4) cm. in diameter and about 3.5 (3–4) cm. high; outer involucral bracts narrowly ovate, arachnose, especially at the margins, with a broad dorsal, medial, glandular ridge and a usually stout apical spine which is about 2.5–4.5 mm. long; innermost involucral bracts much elongated, the flat tip linear or lance-linear, not at all expanded marginally, sometimes hispid at the edge; flowers purple, rarely white; achenes straw-colored, sometimes minutely streaked with brown, 6–7 mm. long and 2.5–3 mm. broad at widest point.

Distribution: plains and foothills, western North Dakota, South Dakota, Nebraska, Oklahoma and Texas westward at low elevations to the Pacific coast states, but commonest in the Great Plains. Reports of this species east of the Great Plains doubtless are a result either of chance introductions or misidentifications.

The type of *Cirsium undulatum* is on deposit at the Philadelphia Academy. A photograph of the type is reproduced in

Plate 1182. It consists of a single basal leaf bearing Nuttall's original tab. Another label added by A. Gray reads "The authentic original representative (and all of it) of *Cnicus undulatus.*" It appears that this statement is probably correct since Dr. F. G. Meyer, in 1950, found no more type material in Nuttall's herbarium. A specimen collected by Culbertson in 1850 mounted with the type is also *C. undulatum.*

An examination of the type provides sufficient evidence that it represents the taxon known as *Cirsium undulatum* (Nutt.) Spreng. var. *megacephalum* (Gray) Fernald or *Cirsium megacephalum* (Gray) Cockerell. This combination of shape and pubescence of the basal leaves is found in no other species of *Cirsium* of this region.

The habitat of *C. undulatum* is given in the original description as "On the calcareous islands of lake Huron, and on the plains of Upper Louisiana." Reference to its occurrence on the islands of Lake Huron is in error, and is possibly resultant from confusion with some other species of *Cirsium* in literature. Nor to the best of my knowledge does the species occur in what is now Louisiana though this is certainly within the limits of possibility. It is, of course, abundant in what was formerly the Louisiana Territory.

C. undulatum is recognizable even in seedling stages by its broad, entire or toothed juvenile leaves and reproduction by root shoots. At maturity the species is marked by its stout habit, large cauline leaves, the middle and upper ones sessile and distinctly clasping the stem, its very large involucres, and its overall densely tomentose nature. It is sometimes confused with *C. flodmanii* in herbaria, but this is principally a result of placing too much reliance on size of involucres. The leaves provide more reliable characters. Although the species sometimes grows with *C. flodmanii*, it, on the whole, occupies drier situations. The species overlap only at the extremes of their tolerance ranges, at the more moist end for *C. undulatum*, and at the drier end for *C. flodmanii*. I have seen no evidence of natural hybridization between them.

A considerable amount of geographical variation exists in this species. A number of variants have been given varietal or specific names. It is not within the scope of the present paper

to discuss more than the midwestern aspect of the species to which Nuttall's type belongs, but a further study of its broader aspects in contemplated.

Cirsium canescens Nutt., in Trans. Am. Phil. Soc. 7: 420. 1841.

Cnicus undulatus var. *canescens* Gray, in Proc. Am. Acad. Arts and Sci. **10**: 42. 1874, in part; Syn. Fl. N. Am. **1** (2): 403. 1884, in part. *Carduus plattensis* Rydb., in Contr. U. S. Nat. Herb. **3**: 167, pl. 2. 1895; Britton and Brown, Ill. Fl. n. U. S. and Canada, **3**: 487. 1898. *Carduus plattensis* var. *spinosior* Rydb., l. c. *Carduus Nebraskensis* Britton, l. c. *Cnicus plattensis* Pammel, in Proc. Iowa Acad. Sci. **8**: Plate XXX. 1901. *Cnicus plattensis* var. *spinosior* Pammel, l. c. *Cirsium plattense* Cockerell ex Daniels, in Univ. Mo. Stud. Sci. **2**: 402. 1911 (Daniels, Fl. Boulder, Colorado, 254. 1911); Fernald ex Robinson, in RHODORA **13**: 240. 1911; Britton, Britton and Brown, Ill. Fl. n. U. S. and Canada, ed. 2, **3**: 551. 1913; Petrak, in Beih. Bot. Centralbl. 35 (2): 430. 1917; Rydberg, Fl. Rocky Mts. 1012. 1917; Fl. Pr. and Plains, 881. 1932. *Cirsium nebraskense* Britton, l. c. 552; Rydberg, Fl. Rocky Mts. 1012. 1917; Fl. Pr. and Pl. 881. 1932. Not *C. nebraskense* Lunell. *Cirsium Lettermanii* Petrak, l. c. 432, nomen nudum in syn.

Biennial from a deep tap root; stems usually 4–8 dm. tall, simple or branched upward, tomentose throughout; first basal leaves narrow, tapering to both ends, entire or undulate-margined, later ones successively more and more deeply lobed, the lobes oblong, all weakly spinose marginally; *cauline leaves decurrent on the stem, the wing usually provided with long, stout spines; blades of the lower cauline leaves mostly deeply pinnatifid into narrowly oblong segments which are 3–6 times longer than broad*, each lobe tipped with a weak spine and armed with still weaker spines marginally; middle cauline leaves less deeply pinnatifid than the lower, the segments ovate or deltoid; *uppermost cauline leaves linear or oblong-linear*, with undulate or dentate weakly spinose margins; lower surfaces of the leaves uniformly white tomentose; upper surfaces of the leaves more sparsely tomentose, usually greener than the lower; inflorescence of a few large, terminal heads at first, and occasionally few to numerous other nearly sessile heads on axillary shoots produced later in the season; first involucres large, usually 2.5–4 cm. broad, 3–4 cm. high, the later ones much smaller; involucral bracts sparingly arachnose to glabrate, minutely puberulent, the outermost ones lanceolate, having a distinct, glandular, medial ridge, and tipped by more or less well developed spines which usually are 2.5–6 mm. long; innermost involucral bracts somewhat elongated, the apical processes spreading, lanceolate, more or less expanded laterally, often erose-margined, translucent; flowers ochroleucous, very rarely pale or dark lavender; achenes straw-colored, often minutely streaked with brown, 6–7 mm. long and about 2.5 mm. broad at point of greatest width.

Distribution: Occurring on the semi-arid hills, plains and roadways of central and western Nebraska, northeastern Colorado, eastern Wyoming and southwestern South Dakota; possibly also in northern Kansas and southeastern Montana; often in sandy soil.

Photographs of Nuttall's type, collected on the "Arid plains of the upper Platte" and now on deposit at the British Museum are

PLATE 1182

Cirsium undulatum (Nutt.) Spreng. Fig. 1, Type, consisting of a single basal leaf. Fig. 2, a Culbertson specimen mounted with the type, consisting of one young plant. Fig. 3, an enlargement of Fig. 2, showing nature of pubescence on stem and foliage.

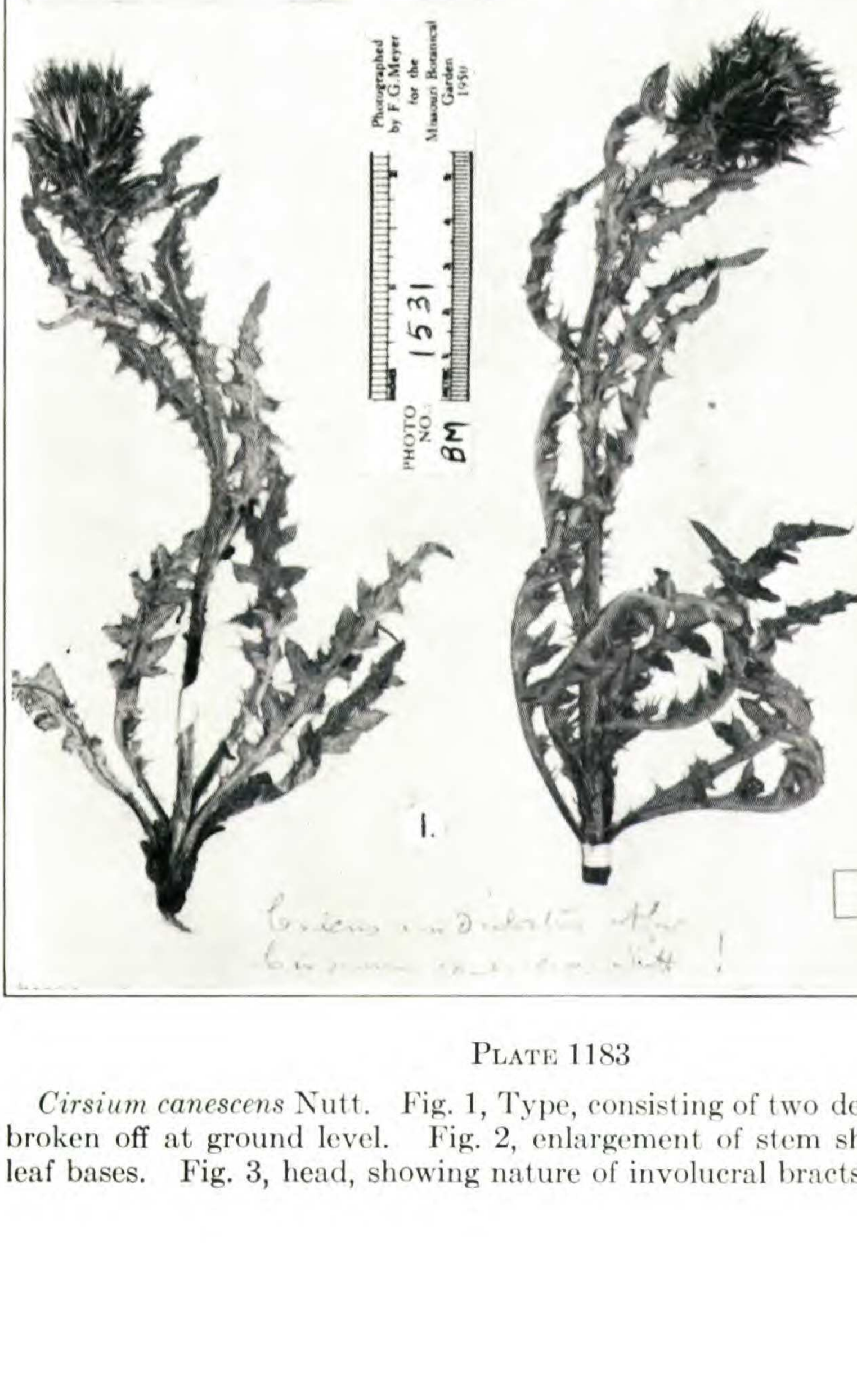

PLATE 1183

Cirsium canescens Nutt. Fig. 1, Type, consisting of two depauperate plants broken off at ground level. Fig. 2, enlargement of stem showing decurrent leaf bases. Fig. 3, head, showing nature of involucral bracts.

reproduced in Plate 1183.[2] It consists of two depauperate plants broken off at the surface of the ground. A comparison of the type photographs of *C. canescens* Nutt. with the type of *C. plattense* (Rydb.) Cockerell provides substantial evidence that both belong to the same species. Rydberg's species was described from several Nebraska specimens, the type designated being *Rydberg 1356* from "Near Plummer Ford, Dismal River, Thomas County, on sandhills," July 5, 1893, and now deposited in the herbarium of the New York Botanical Garden. The two proposed species share the following features: the pinnatifid basal and lower cauline leaves, the lobes usually narrowly oblong in outline (more narrowly oblong in the type of *C. plattensis*); leaves progressively less pinnatifid up the stem, the uppermost lanceolate to linear, dentate or undulate margined; bases of the cauline leaves strongly decurrent; involucral spines comparatively short. This seems to the writer sufficiently strong evidence to warrant combining of the two proposed species. Further, field studies to date have provided no evidence that there is more than one species in which these features are combined in the region in question.

Nuttall described *C. canescens* as having "Florets pale rose,—" This could have been true although the predominating color of the corollas in this species is ochroleucous. The corollas often are tinted with lavender in the western part of the species range, and occasionally are even deep lavender. I can explain Nuttall's statement "The roots creeping as in *C. arvense*" only by hypothesizing that in this respect it was confused with *C. flodmanii*. The type specimen offers no support to Nuttall's statement.

[2] Nuttall crossed the continent with a party led by Nathaniel J. Wyeth on Wyeth's second expedition to Oregon. The following information taken from Wyeth's Journals, published as Vol. I, Parts 3 to 6 of "Sources of the History of Oregon," University of Oregon Press, 1899, is pertinent. The party traveled along and near the North Platte River from near its junction with the South Platte westward through Nebraska, crossing into what is now Wyoming on May 31, 1834 and leaving the Platte at the Red Buttes, Natrona Co., on June 8. Nuttall's "Arid plains of the upper Platte" probably, therefore, are correctly located in eastern Wyoming somewhere within a few miles of the river. One can safely assume that the latest possible date for collecting the type was June 8. The elevation of the plains in this region increases from about 4,000 feet at the state line to just over 5,000 feet at Casper, Wyoming, which is only a few miles northeast of the Buttes. In view of the early date, elevation and aridity of the region, it is not surprising that Nuttall brought back very immature, dwarfed specimens. I have collected this species in bud, flower and early fruit at Douglas, Wyoming, on July 21, or approximately six weeks later in the season. The plants were of normal size.